



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,658	12/05/2003	Ping-Chen Liu	X-1175 US	2741
24309	7590	04/05/2005	EXAMINER	
XILINX, INC ATTN: LEGAL DEPARTMENT 2100 LOGIC DR SAN JOSE, CA 95124			ENGLUND, TERRY LEE	
			ART UNIT	PAPER NUMBER
			2816	

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/729,658

Applicant(s)

LIU, PING-CHEN

Examiner

Terry L. Englund

Art Unit

2816

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 and 19 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 10, 12-17, 20-25, 30, 32, and 34-48 is/are rejected.
- 7) ☒ Claim(s) 3-9, 18, 26-29, 31 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 01262004 and 12052003
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION***Specification***

The disclosure is objected to because of the following informalities: It is believed page 8, line 13 of paragraph 0027 should have --202(1) – 202(n)-- instead of “200(1) – 200(n).” Page 9, line 12 of paragraph 0031 should have --353-- instead of “351.” Appropriate corrections are required.

Claim Objections

Claims 2-10, 12-18, 20-33, 35-41, and 36 are objected to because of the following informalities: For consistent labeling, it is suggested “circuit” on line 1 of each of claims 2-10, 12-18, 20-33, and 35-41 be changed to --charge pump circuit--. For example, consistent labeling will minimize possible confusion with respect to “The circuit” of claims 12-18 with the “charge pump circuit” and the “switching circuit”, both recited in their independent claim 11. To minimize possible confusion between claim 36’s “output node” and “input node” with respect to “an output of the first charge pump” (lines 2-3) and “an input of the second charge pump” (lines 3-4) recited within claim 35, the following changes to claim 36 are suggested: 1) delete “node” from lines 4, 7, and 8; and change “an output” on line 7 to --the output--. Dependent claims carry over any objection(s) from any claim(s) upon which they depend. Appropriate corrections are required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 2816

Claims 12-13, 20-25, 30, 32, 35-40, and 42-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. It is believed the phrase “the switching circuit connects only the first charge pump to the voltage rail” in claim 12 is misleading. This limitation implies that the second charge pump might not be connected to the voltage rail. However, using the applicant’s own Fig. 1 as a reference, output OUTB of second charge pump 120 is permanently connected to voltage rail VNN, wherein switching circuit 130 allows output OUTA of first charge pump 110 to be selectively connected to either voltage rail VNN, or input INB of second charge pump 120. Also, claim 13 recites the first/second charge pumps are connected in series with the voltage rail by the switching circuit. Therefore, unless the second charge pump is already connected to the voltage rail, how can the switching circuit of claim 11 connect these charge pumps in series with the voltage rail? For example, clarification is requested with respect to how only the first charge pump is connected to the voltage rail, or it is suggested the “connects only” phrase in claim 12 be changed to --selectively connects-- to more clearly recite the operation of the claimed invention. It is not clear in each of claims 20 and 21 how “the means for selectively connecting”, “the first charge pump means”, and “the second charge pump means” relate to means recited within claim 19. For example, does each “means” within claims 20 and 21 refer to only a single corresponding means, or to each of the corresponding means within claim 19. It is suggested --each of-- be added prior to “the means” on line 1 of both claims 20 and 21; and --corresponding-- be added prior to each occurrence of both “first charge pump means” and “second charge pump means” recited within both claims 20 and 21. This will help to distinguish the various, understood plurality of means from one

Art Unit: 2816

another. For similar reasons, it is also suggested “the first switch” on line 1 of claim 22 be changed to --each of the first switches--; and --corresponding-- be added prior to “first charge” on line 4 of the same claim. Otherwise, it appears claim 22 might be referring to only one single “first switch”, although it is believed each means for selectively connecting would comprise its own first switch. Also, it is suggested “the second switch” on line 1 of claim 23 be changed to --each of the second switches--; and --corresponding-- be added prior to both the “first charge” on line 4, and the “second charge” on line 5 of claim 23. The singular “the first charge pump means” and “the second charge pump means” in claims 24 and/or 25 can be misleading if they are referring to only one single charge pump means. Therefore, it is suggested --each of-- be added prior to “the first” on line 1 of both claims 24 and 25, and prior to “the second” on line 2 of claim 24 and on line 3 of claim 25. It is not clear in claim 30 if each switching circuit comprises its own PMOS transistors, or if all the switching circuits in general comprise at least two transistors. For example, each circuit could comprise one or more transistors; or as long as there’s at least two transistors total within all of the switching circuits, then the circuits can be considered as comprising transistors. Similarly, it is not understood in claim 32 if each of the first and second logic gates comprises more than one AND gate, or if each logic gate comprises a single, corresponding AND gate. It is not clear in each of claims 35 and 36 how the singular “the first switching circuit”, “the first charge pump”, and “the second charge pump” relate to the circuits and pumps within claim 34. Therefore, it is suggested --each of-- be added prior to “the first” on line 1 of both claims 35 and 36; “circuit” on line 2 of both claims be changed to --circuits--; and --corresponding-- be added prior to each occurrence of “first charge pump” and “second charge pump” within both claims. It is not understood in claim 37 if all of the charge

Art Unit: 2816

pumps are controlled by their respective oscillation signal, or if only at least two of them are (e.g. see “the...pumps are”). It is suggested --each of-- be added prior to “the first” and “the second” on lines 1 and 2-3, respectively, and “are” on lines 2 and 3 be changed to --is--. For similar reasons, it is also suggested --each of-- be added prior to “the first” and “the second” on lines 1 and 2-3, respectively of claim 40; “include” on line 2 be changed to --includes--; and “do” on line 3 be changed to --does-- within the same claim. It is not clear how the singular “the pumped voltage” on line 10 of claim 42 relates to the plural “pumped voltages” recited within the claim’s preamble.

The terms “optimize efficiency” and “maximum pumped voltage” in claims 10 and 14 are considered relative terms which render the claims indefinite. The terms “optimize efficiency” and “maximum pumped voltage” are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For example, as long as the circuit provides its desired pumped voltage within acceptable tolerance levels, the circuit can be considered as operating efficiently, and providing its desired “maximum” voltage.

Claim 16 recites the limitation “the two-phase oscillation signal” in line 3 with no clear antecedent basis for this limitation in the claim. For example, how do these oscillation signals relate to the “four-phase oscillation signal” or the “two-phase clock signal” recited within claim 11?

For similar reasoning as applied above with respect to claims 10 and 14, the terms “optimally efficient” and “maximum pumped voltage” in claim 34 (lines 8 and 10-11, respectively) are considered relative terms which render the claims indefinite.

Art Unit: 2816

For similar reasoning as applied above with respect to claims 10, 14, and 34, the terms “optimally efficient” and “maximum negative voltage” in claim 41 (lines 6 and 7, respectively) are considered relative terms which render the claims indefinite.

Dependent claims carry over any rejection(s) from any claim(s) upon which the depend.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Taub et al. (Taub). Fig. 1 shows a charge pump circuit for generating pump voltage PUMP OUTPUT, wherein the charge pump circuit comprises first charge pump means 12A-12E responsive to first set (i.e. CLK1,CLK2,CLK3,CLK4,...) of clock signals; second charge pump means PUMP B responsive to a second set (CLK3,CLK4,CLK1,CLK2,...) of clock signals; and means 17-19 for selectively connecting the second charge pump means in series with the first charge pump means in response to mode signal MODE_CTL. The two sets of clock signals can be considered different from one another in at least two different interpretations: 1) first/second stages 12A/12B of the first charge pump means respond to signals CLK1,CLK2/CLK3,CLK4, respectively, wherein first/second stages 12F/12G of the second charge pump means respond to signals CLK3,CLK4/ CLK1,CLK2, respectively. Therefore, the clock sets are provided to their respective stages in a reversed order. 2) The first charge pump means responds to the first set of clock signals including three pair of CLK1,CLK2 signals, and two pair of CLK3,CLK4 signals,

Art Unit: 2816

wherein the second charge pump means responds to only two pair of CLK1,CLK2 signals, and three pair of CLK3,CLK4 signals. Also, the second set of clock signals includes one additional CLK1 signal (e.g. see stage 14). Therefore, claim 1 is anticipated. Since the first/second charge pump means provide a PUMP OUTPUT of approximately $6 V_{cc} - V_t$ when mode signal MODE_CTL is deasserted (e.g. see column 1, lines 44-56), and the second charge pump means allows a higher output voltage, at higher current (e.g. see column 2, lines 3-16, and the output of stage 12J is approximately $11 V_{cc}$ and coupled to PUMP OUTPUT), the first charge pump means can be considered as operating at optimized efficiency (e.g. providing a desired output), and the second charge pump means can be considered as generating a maximum pumped voltage (e.g. $11 V_{cc}$). This anticipates claim 10. Detailed examples of charge pump stages 12A-12C are shown in Fig. 3. Although transistors PT1-PT3 are identified as precharge transistors (i.e. see column 4, lines 1-2), one of ordinary skill in the art would recognize them as threshold canceling transistors that will cancel, or compensate for the threshold voltages of coupling transistors CT1-CT3. Therefore, each of the first/second charge pump means of Taub's charge pump means include voltage cancellation circuitry, and claim 2 is anticipated.

Allowable Subject Matter

Claims 11, and 19 are allowed. There is no strong motivation to modify or combine any prior art reference(s) to ensure: 1) the first/second charge pumps respond to the four-phase oscillation signal/two-phase clock signal, respectively as recited within claim 11; 2) the second charge pump means within each of the charge pumps responds to a second set of clock signals different from the first clock signals each of the first charge pump means responds to, as recited within claim 19.

Art Unit: 2816

Claim 18, which depends on allowed claim 11, contains the objection with respect to “The circuit” as previously described, but would be allowable otherwise.

Claims 26-29, 31, and 33, which all depend on allowed claim 19, each contain the objection with respect to “The circuit” as previously described, but would be allowable otherwise.

Claims 3-9 are only objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. There is no strong motivation to modify or combine any prior art reference(s) to ensure: 1) the second charge pump means does not include threshold voltage cancellation circuitry, wherein this circuitry is included in the first charge pump means, as recited within claim 3; 2) the means for selectively connecting includes the first/second switches as recited within claim 4 (upon which claims 5 and 6 depend); and 3) the first/second sets of clock signals include four-phase/two-phase oscillation signals as recited within claim 7 (upon which claims 8-9 depend).

Claims 34 and 42 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action. There is presently no strong motivation to modify or combine any prior art reference(s) to ensure: 1) a charge pump circuit comprises the combination of first/second charge pumps, first switching circuit, and plurality of second switching circuits as recited within claim 34; and 2) the selective parallel connection of charge pump circuits as recited within claim 42, wherein each charge pump circuit selectively connects a second charge pump circuit in series with a first charge pump circuit in response to a mode signal.

Art Unit: 2816

Claims 12-17, 20-25, 30, 32, 35-41, and claims 43-48 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. Claims 12-17 depend on allowed claim 11; claims 20-25, 30, and 32 depend on claim 19; claims 35-41 depend on claim 34; and claims 43-48 depend on claim 42.

Prior Art

The other prior art references on the accompanying PTO-892 are deemed relevant to at least sections of the claimed inventions. Osawa et al. shows examples of a charge pump circuit (e.g. see Fig. 1) comprising first/second charge pump means 11,12/13,14 of the threshold canceling types (e.g. see related paragraphs 0006 and 0014, and Fig. 10's threshold canceling transistors Tp4,Tp6), wherein these means are coupled in series by selecting means 20 and mode signal SWHON. Fig. 4 of Zeng also shows an example of a charge pump circuit comprising first/second charge pump means 32/34 of threshold canceling types (e.g. see transistors T1a-T8a), wherein these means are coupled in series by selecting means 36 and mode signal SEL. However, both the Osawa et al. and Zeng references have their respective first/second charge pump means responding to the same set (order) of clock signals. Miki shows an example of a two-phase charge pump in Fig. 1; a four-phase charge pump in Fig. 5; and first/second charge pumps 3/4 that are selectively coupled in series with respect to selection means MN1 in Fig. 9. However, selection means of Fig. 9 responds to the output voltage instead of to a mode signal, and both charge pumps respond to the same set (order) of four-phase oscillation signals. The Javanifard et al. reference shows and discloses a charge pump circuit in Fig. 3 having a plurality of charge pumps that can be selectively connected in parallel and/or series (see column 4, line 49

Art Unit: 2816

through column 5, line 55). However, this reference does not clearly show or disclose the clocking signals, and it lacks a second switching circuit that has an input coupled to an output of a corresponding charge pump, an output coupled to voltage rail 350, and a control terminal receiving a corresponding select signal (e.g. as recited within claim 34 of the present application). Still, all of these references should be carefully reviewed and considered.

The prior art references cited on the IDS forms submitted on Dec 5, 2003 and Jan 26, 2004 were reviewed and considered. Caser et al. shows/disclose a charge pump utilizing four-phase oscillation signals, and threshold cancellation, but does not clearly show/disclose the selective series connection of first/second charge pump means. Javanifard et al. shows/discloses first/second charge pumps 110/120 being selectively coupled in parallel, or in series, between input 160 and output 150. However, this reference lacks details of each charge pump and its clock signals. Fig. 9(d) of Tanzawa et al. shows a charge pump circuit with selective parallel/series connected charge pumps, but the first/second charge pumps respond to the same set (order) of signals.

Any inquiry concerning this communication from the examiner should be directed to Terry L. Englund whose telephone number is (571) 272-1743. The examiner can normally be reached Monday-Friday from 7 AM to 3 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Callahan, can be reached on (571) 272-1740.

The new central official fax number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (571) 272-1562.

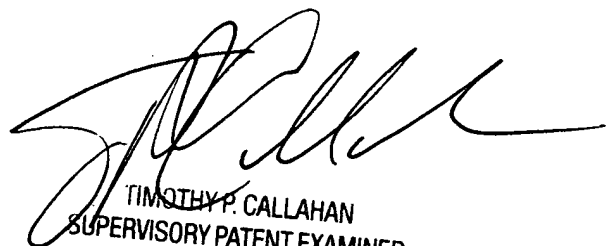
Art Unit: 2816

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Terry L. Englund

24 March 2005



TIMOTHY P. CALLAHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800